Exelon Nuclear

10CFR50.73

March 31, 2008

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 2
Facility Operating License No. NPF-85
NRC Docket No. 50-353

Subject: LER 2008-002-00, Automatic Actuation Of The Reactor Protection System At Power

This Licensee Event Report (LER) addresses an event that resulted in an automatic actuation of the reactor protection system (RPS) at power. A phase-to-ground fault occurred at the 2A Main Transformer low voltage (22 kV) bushing connection to the Iso-Phase Bus. The Main Generator neutral overvoltage relay actuated and tripped the generator protection lockout relays, which resulted in a Main Turbine trip.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Original signed by

Christopher H. Mudrick
Vice President – Limerick Generating Station
Exelon Generation Company, LLC

cc: S. J. Collins, Administrator Region I, USNRC
E. M. DiPaolo, USNRC Senior Resident Inspector, LGS

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE: Automatic Actuation Of The Reactor Protection System At Power

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	01	2008	2008	- 002 -	00	03	31	2008		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER *(Include Area Code)*
Robert E. Kreider, Manager – Regulatory Assurance	610-718-3400

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	FK	XFMR	M175	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

A valid automatic actuation of the reactor protection system occurred as a result of a phase-to-ground fault at the 2A Main Transformer low voltage (22 kV) bushing connection to the Iso-Phase bus. The Main Generator neutral overvoltage relay actuated and tripped the generator protection lockout relays, which resulted in a Main Turbine trip. The cause of the ground fault was overheating of the bolted connection between the Main Transformer bushing and the flexible links that connect the bushing to the Iso-Phase Bus. The degraded bushings and flexible links were replaced. The transformer maintenance procedure was revised to provide enhanced direction for assembly of the bolted connection.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A) (17)*

Unit Conditions Prior to the Event

Unit 2 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On Friday, February 1, 2008, Limerick Unit 2 was operating at 100% power. At approximately 04:45 hours an automatic actuation of the reactor protection system (RPS) (EIIS:JC) occurred as a result of a phase-to-ground fault at the 2A Main Transformer (EIIS:XFMR) low voltage (22 kV) bushing connection to the Iso-Phase Bus (EIIS:EL). The Main Generator neutral overvoltage relay actuated and tripped the generator protection lockout relays, which resulted in a Main Turbine trip. The operators entered the trip procedure for reactor pressure vessel (RPV) control (T-101) and stabilized reactor parameters. All control rods fully inserted.

Reactor wide range level indication decreased to -2.0 inches and then increased to a maximum of +46 inches and stabilized at +35 inches. Reactor pressure was approximately 1042 psig prior to the automatic scram, peaked at 1140 psig, and stabilized at approximately 965 psig one minute after scram. The reactor high pressure scram setpoint of 1096 psig was exceeded but RPS had previously initiated due to the main turbine control valve closure. The redundant reactivity control system (RRCS) setpoint of 1149 psig was not exceeded. The lowest main steam relief valve (MSRV) setpoint of 1170 psig was not exceeded; therefore, no MSRVs actuated. The main steam bypass valves opened as designed to control pressure post scram.

Primary containment isolation signals were automatically initiated at +12.5 inches reactor level. A Group 2 isolation occurred at +12.5 inches but the isolation valves were in the closed position prior to the event. The reactor

recirculation pumps motor-generator set breakers tripped due to the main generator lockout.

The investigation determined that a phase-to-ground fault occurred on the Iso-Phase Bus connection at the 2A Main Transformer low voltage (22kV) bushing due to overheating of the connection.

This event resulted in an actuation of RPS when the reactor was critical and a valid actuation of RPS and containment isolation valves. The 4-hour ENS notifications required by 10CFR50.72(b)(2)(iv)(B) and the 8-hour notification required by 10CFR50.72(b)(3)(iv)(A) were performed on Friday February 1, 2008 at 05:46 hours (#43949).

This event resulted in automatic actuations of RPS and containment isolation valves. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were minimal. A turbine trip with bypass transient is categorized as an incident of moderate frequency per UFSAR section 15.2.3, "Turbine Trip". The plant equipment performed as designed during the transient and the operators effectively stabilized reactor parameters.

The 2A Main Transformer low voltage (22kV, air side) X1 bushing failed at the electrical connection between the bushing flange and the flexible copper link to the Iso-Phase Bus. This failure caused a phase-to-ground fault. Both X1 and X2 bushings on this transformer went into service in March 2007 when 2A Main Transformer was exchanged with the on-site spare.

The failure likely initiated in the electrical contact surface between the bushing and the copper links. This failure then propagated to the grounded Iso-Phase enclosure and caused the Main Generator protective relay actuation. The failure was initiated by a degraded contact surface that was conducting rated electrical current.

Cause of the Event

The scram was caused by a Main Turbine trip as a result of a Main Generator Iso-Phase Bus ground fault. The ground fault was due to overheating of the 'A' phase connection between the Iso-Phase bus flexible link and the X1 low voltage (22 kV) bushing at the 2A Main Transformer.

The root cause of this event was inadequate change management when the Limerick Main Transformer maintenance ownership was transitioned from Exelon Energy Delivery (EED) to the site in January 2001. Specifically, procedure connection details were not subsequently transferred from EED procedures into station site procedures.

There were two contributing causes related to procedural deficiencies and the lack of training.

Corrective Action Completed

1) Both X1 and X2 bushings were replaced with reconditioned bushings having the 2x7 bolt pattern (i.e., original configuration).

2) All Unit 2 main transformer low voltage bushings were prepared and assembled using the upgraded guidance now contained in procedure M-035-003.

Corrective Action Planned

The Limerick electrical work force and electrical planners will be provided training on proper treatment and assembly of electrical power conductors.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A) (17)*

Previous Similar Occurrences

There were no previous similar occurrences of scrams caused by Iso-Phase bus ground faults. However, a scram due to overheating of the Doble links of a Main Transformer high voltage bushing was reported in LER 1-00-002. The corrective actions for the previous event were effectively implemented. However, during the transition of Main Transformer maintenance from EED to the station Maintenance organization, they were not subsequently transferred from EED procedures into station site procedures due to less than adequate change management.

Component data:

Component description:	2A Main Transformer
Component number:	2A-X101
Manufacturer:	M175 McGraw Edison Co
Model number:	CC-464368 DWG
Serial number:	C-07005-5-3

References:
M-035-003, X101 Oil Cooled Transformers Cleaning, Examination, and Testing
M-200-005, Non-safety Related Oil Cooled Transformers Clean and Examine